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Fact Sheet

SEISMOLOGICAL OBSERVATION OF IMPACTS AND COLLAPSES AT WORLD TRADE CENTER

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Seismograph stations in southern New York, northern New Jersey, western Connecticut, and Pennsylvania, operated by the Lamont-Doherty Earth Observatory of Columbia University, recorded the collapse of each of the towers of the World Trade Center on Tuesday morning September 11 and the subsequent collapse of 7 World Trade Center later that afternoon. The closest station, at Palisades, New York, is located 21 miles (34 km) north of lower Manhattan in Rockland County. This station also registered the impacts of the two airliners that crashed into the towers.

The signals generated by the collapsing North and South towers were much larger than those from the two airliner impacts. The signals generated by the collapse of Building 7, however, were smaller than those of the impacts. In addition, many smaller signals were registered at Palisades throughout the rest of the day that may have originated from the further collapse of the Twin Towers and the fall of walls and other debris in the surrounding area.

The Palisades recordings of the Twin Tower collapses were comparable in size to the signals from a small earthquake of seismic magnitude 2.4 that was felt in the east side of Manhattan and in the western parts of Queens earlier this year, on January 17.

The seismic signals from the five events on 11 September differed from a small earthquake in that they were richer in low-frequency energy and poorer in high-frequency energy. These differences can be attributed to the short time duration of the fault rupture responsible for the earthquake as compared to the long and complex collapse of the buildings. The seismic waves from the five World Trade Center events resemble those produced by the collapse of a salt mine south of Rochester, in 1994.

The catastrophic events at the World Trade Center, as might be expected, produced much larger seismic effects than the bombing of the World Trade Center in 1993. The seismic effects of the collapses are comparable to the explosions at a gasoline tank farm near Newark on January 7, 1983, which were detected up to 130 miles away.

The seismographic stations are part of the Lamont-Doherty Cooperative Seismographic Network, which is operated in conjunction with several other institutions and is supported by the U.S. Geological Survey under the National Earthquake Hazard Reduction Program. As part of its agreement with the USGS, Lamont-Doherty makes this data available upon request without restriction.

Preliminary measurements made by Lamont-Doherty analysts are summarized in the Table below:

Information Based on Seismic Waves recorded at Palisades New York

Event	origin time (EDT)	Magnitude	
Duration	(hours:minutes:seconds)	(equivalent seismic)	
Impact 1 at North Tower	08:46:26±1	0.9	12 seconds
Impact 2 at South Tower	09:02:54±2	0.7	6 seconds
Collapse 1, South Tower	09:59:04±1	2.1	10 seconds
Collapse 2, North Tower	10:28:31±1	2.3	8 seconds
Collapse 3, Building 7	17:20:33±1	0.6	18 seconds

More information may be obtained on the World-Wide Web at:

http://www.ldeo.columbia.edu/LCSN/Eq/20010911_wtc.html

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